

REMARKS

Claims 1 and 4-19 remain in this application. Claims 2-3 were previously canceled. Reconsideration of the application is requested.

Independent claims 1, 5, and 12 are rejected under 35 U.S.C. § 103(a), along with dependent claims 4, 6-11, and 13-19, as being unpatentable over International Publication WO 01/55585 A1 to Ogura et al. in view of U.S. Patent 6,338,747 to Kosco. These same claims are also rejected under 35 U.S.C. § 103(a) as being unpatentable over the Ogura et al. publication in view of U.S. Patent 5,466,276 to Sato et al. Reconsideration is requested.

Currently amended independent claim 1 defines that the swirler is martensitic stainless steel, ferritic stainless steel, or austenitic stainless steel including SUS410, SUS410L, and SUS440C and has a hardness of no less than 90 HRB but less than a hardness of the valve member. Claim 5 specifies that the hardness of the swirler is less than the hardness of the valve member. Finally, claim 12 specifies that the swirler wears but the valve member does not wear when they contact each other. The features reflected by the limitations in claims 1, 5, and 12 mentioned help to reduce fuel leakage as discussed in lines 22-27 on page 13, and neither the Ogura et al. publication and the Kosco patent taken as a whole nor the Ogura et al. publication and the Sato et al. patent taken as a whole suggest the limitations in claims 1, 5, and 12 mentioned above.

The following should additionally be noted. A hardness of 90 HRB (B level Rockwell hardness) as specified in Claim 1 corresponds to about 188 HV (Vickers hardness) and about 8 HRC (C level Rockwell hardness). A gap between a swirler and a valve member is about 7 μm . A swirling force is provided for fuel passing through the swirler, but is not for fuel passing through the gap, and that part of fuel which is not

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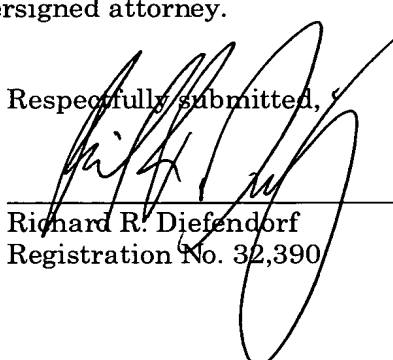
given the swirling force flows to an injecting port through a center of an injecting fuel passage, and injected. By the injection of the fuel, a hollow cone spray is formed. A portion of the fuel which is provided with the swirling force flows to an injecting port by swirling along the injecting fuel passage, and injected; by this injection, a solid (not hollow) spray is provided. The solid spray is positioned in the center of the hollow cone spray, and plays an important role in combustion. If the fuel of the solid spray causes a distortion, combustion is negatively affected. If, in turn, the wear between the valve member and the swirler is small, the secular distortion of the solid spray will also be small.

It is respectfully submitted that each of the independent claims in this application is patentable for reasons discussed above. The remaining, dependent claims of this application are patentable as well.

Should the Examiner have any questions after considering this Reply, the Examiner is invited to telephone the undersigned attorney.

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Respectfully submitted,



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DRAWING AMENDMENT

Please amend Figure 4C by replacing the drawing sheet including Figure 4C with the replacement sheet appended to this Reply. A marked-up version of original Figure 4C, showing the change made in the replacement sheet, in red, is also appended to this Reply.



FIG.4A

FIG.4B

FIG.4C

